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FLOOD INSURANCE STUDY

ORIGINAL

TOWN OF CATHLAMET, WASHINGTON
WAHKIAKUM COUNTY

SEPTEMBER 29, 1986

Federal Emergency Management Agency

COMMUNITY NUMBER - 530278

51

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FLOOD INSURANCE STUDY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Town of Cathlamet, Wahkiakum County, Washington, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study has developed flood risk data for various areas of the community that will be used to establish actuarial flood insurance rates and assist the community in its efforts to promote sound flood plain management. Minimum flood plain management requirements for participation in the National Flood Insurance Program (NFIP) are set forth in the Code of Federal Regulations at 44 CFR, 60.3.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than the minimum Federal requirements. In such cases, the more restrictive criteria take precedence and the State (or other jurisdictional agency) will be able to explain them.

1.2 Authority and Acknowledgments

The sources of authority for this Flood Insurance Study are the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses for this study were performed by the U.S. Army Corps of Engineers (COE), Portland District, for the Federal Emergency Management Agency (FEMA), under Inter-Agency Agreement No. EMW-E-1153, Project Order No. 1, Amendment No. 29. This study was completed in February 1985.

1.3 Coordination

A precontract coordination meeting was held on July 25, 1983, at the Town of Cathlamet. The meeting was attended by Cathlamet officials and representatives of FEMA and the COE, Portland District. The purpose of the meeting was to inform the town of its NFIP status, to gather all available pertinent data on flooding in the community, and to reach an agreement on the areas to be studied. Also discussed at the meeting were flood hazards and possible high-water mark locations (Reference 1).

An intermediate coordination meeting was held on July 22, 1985, and attended by representatives of FEMA and the Town of Cathlamet. No problems were raised at the meeting.

The final community coordination meeting was held on December 18, 1985, and attended by representatives of FEMA, the study contractor, and the community. All problems raised at that meeting have been addressed in this study.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated areas of the Town of Cathlamet, Wahkiakum County, Washington. The area of study is shown on the Vicinity Map (Figure 1).

The Columbia River from River Mile (R.M.) 33 to the eastern Wahkiakum County boundary at R.M. 51.6 was studied by detailed methods for the Wahkiakum County Flood Insurance Study (Reference 2). That reach includes the 1.4-mile reach of Cathlamet Channel on which Cathlamet fronts.

The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development or proposed construction through February 1990.

Birnie Creek from its mouth to approximately 800 feet upstream of State Highway 4 was studied by approximate methods.

The scope and methods of study were agreed upon by FEMA and the Town of Cathlamet. Approximate analyses were used to study those areas having a low development potential or minimal flood hazards.

2.2 Community Description

The Town of Cathlamet is located at the confluence of Birnie Creek with Cathlamet Channel on the Columbia River, in the southeastern part of Wahkiakum County, in the southwestern corner of Washington. The town is approximately 30 miles west of Longview, Washington, and approximately 75 miles northwest of Portland, Oregon, via Interstate Highway 5 and State Highway 4, respectively. The town is located on the northern bank of the Columbia River where the channel separates around Puget and Little Islands. The main waterway for navigation is the south channel along the Oregon shore of the Columbia River.

The area was settled in 1846 by James Birnie, a long-time employee of the Hudson Bay Company, and his family, when the company sent him to operate a store built for trading purposes. In 1850, Mr. Birnie

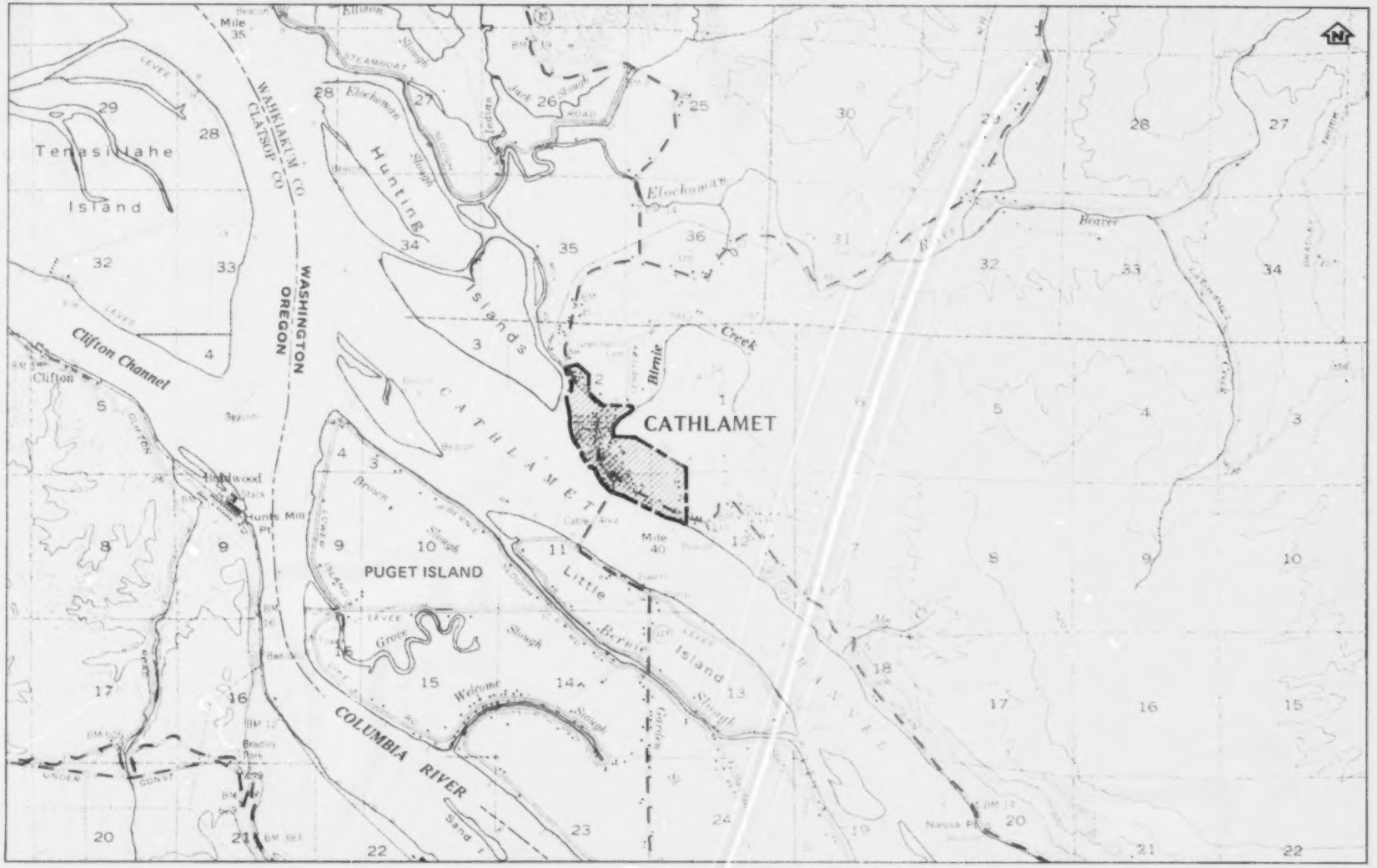

FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY

TOWN OF CATHLAMET, WA
(WAHKIAKUM CO.)

APPROXIMATE SCALE
1 0 1 2 3 MILES

VICINITY MAP

filed a donation land claim that covered the entire townsite, which he called Cathlamet after the local Indian tribe. In 1854, Wahkiakum County was created by the Washington Territory government, and the community of Cathlamet became the county seat (Reference 3).

On January 17, 1907, the community was incorporated and had a population of 350. That increased to 615 by 1960 and 647 by 1970. By 1980, the population dropped to 584, but an estimate for 1984 put it at 630 (Reference 4).

Cathlamet is the commercial, retail, and service center and county seat of Wahkiakum County. The economy of the area is based on agriculture, logging, and commercial gillnet fishing in the Columbia River. A commercial fish cannery provided significant employment until it closed in 1929. The economic activity of the town today is devoted wholly to retail and service functions.

The historical and natural attributes of Cathlamet are a significant part of the community's character. The old Hudson Bay Company house built by James Birnie in 1860, which is included in the State register of historic places, and the displays at the Wahkiakum County Historical Museum provide visual links to the past (Reference 5). The forested hills north and east of Cathlamet and the broad Columbia River provide a natural setting. The Columbia River Basin is nationally known for its chinook and coho salmon, steelhead, and trout fishing. Deer, elk, and other wildlife are commonly sighted in the area around the town.

The climate of Cathlamet, because of its location on the Columbia River where it cuts through the Coast Mountain Range, is characterized by mild, wet winters and warm, dry summers. The mean monthly temperatures range from 38°F in January to 64°F in July. Normal annual precipitation is approximately 50 inches with 65 percent falling from November to March (Reference 6). Summers are characterized by limited rainfall, but moist air prevails throughout most of the year because of the Columbia River.

The Columbia River upstream of Cathlamet drains an area of approximately 257,000 square miles. Birnie Creek drains an area of 1.6 square miles.

The soils in and around Cathlamet vary from soft organic silt around the Cathlamet Boat Basin in the northwestern part of the town to decomposed sandstone and basalt over the rest of the area. The geological formations under Cathlamet consist of firm sandstone strata more than 40 feet thick underlain by basalt bedrock and topped by a basalt flow. These basalt and sandstone strata dip downstream (toward the northwest) at a slope of 3-1/2 degrees. On the northeastern side of the boat basin the sandstone and overlying basalt are exposed in a 70-foot bluff. Upstream on the southeastern end of town, the underlying basalt bedrock is exposed and makes up

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part of the cliffs that rise to 150 feet above the river level within 50 feet of the water's edge and to more than a 200-foot elevation within 250 feet of the water's edge (Reference 6).

2.3 Principal Flood Problems

The Columbia River and Birnie Creek are the principal sources of flooding in Cathlamet.

The history of flooding on the Columbia River indicates that flooding is primarily caused by heavy spring runoff from snowmelt in the eastern part of the basin. Severe flooding can also occur in the fall and winter from intense rainfall over the western part of the basin augmented by snowmelt when the soil is near saturation. Damaging spring and summer floods may occur any time between mid-May and late June and may last 2 to 3 weeks. Fall and winter floods are infrequent and last only a few days.

At least four major floods have occurred in the last 40 years, during June 1948, June 1950, June 1956, and December 1964. The worst flooding to occur on the Columbia River occurred in June 1894. Figure 2 shows the June 1948 Columbia River flood from an aerial view of Cathlamet.

Of the seven largest floods known to have occurred on the Columbia River, the stage reached (Columbia River Datum (CRD)) and flood elevation (National Geodetic Vertical Datum (NGVD)) at the Wauna gage (R.M. 41.8) near Cathlamet are shown in Table 1 (Reference 7). Also shown are peak discharges at The Dalles, Oregon gage/gaging station (R.M. 119), the nearest gaging station with a reliable discharge measurement, and the approximate recurrence intervals (Reference 8).

Flooding from Birnie Creek is generally caused by rainfall in the winter, the period of greatest local storm activity. Floods rise quickly following a heavy rainstorm and usually last only one or two hours.

Since there is no stream gage on Birnie Creek, flooding is not well documented; however, according to local officials, no large floods on Birnie Creek have occurred. The small contributing drainage area of less than 2 square miles does not produce large streamflows, and a well-armored and clean channel through portions of the study reach also reduces possible future flood levels. However, the four roads that cross Birnie Creek through the study reach have culverts that may back up as the result of obstructed flow.

2.4 Flood Protection Measures

More than 50 flood-control storage projects on the Columbia River and its tributaries have a significant impact on flood peaks. The

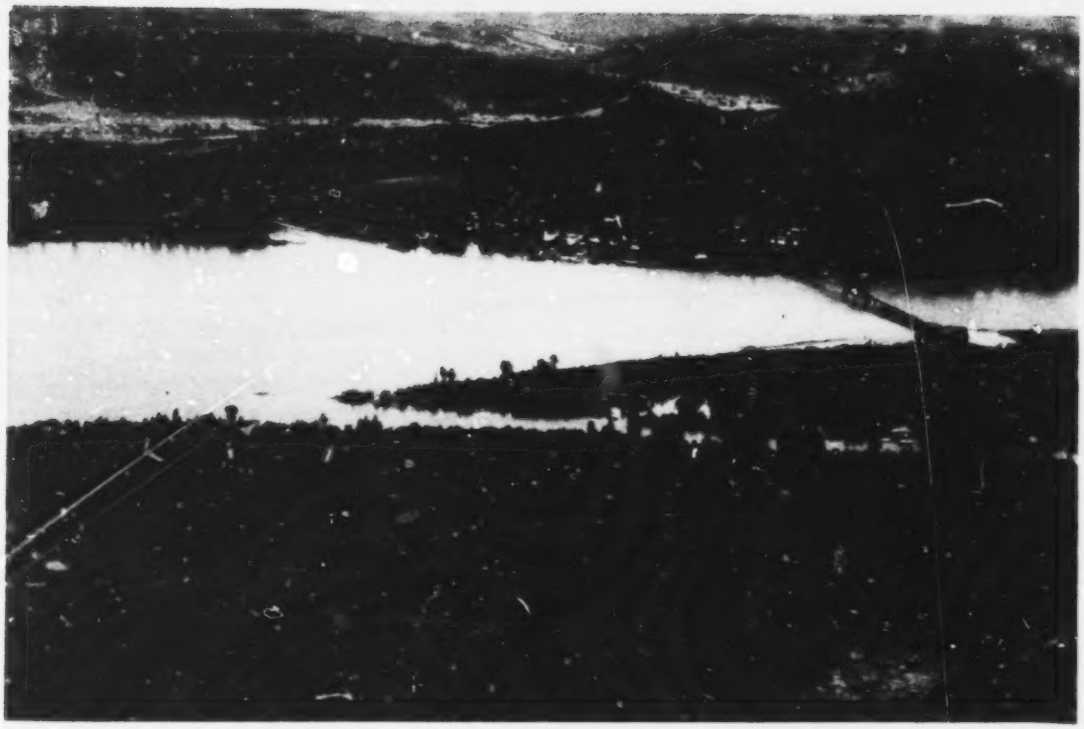

Figure 2. Columbia River June 1948 Flood Event at Cathlamet, Washington, Prior to Flood Crest

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Table 1. Summary of Flood Stages

Flood	Maximum Stage and Elevation at M. 41.8 near Cathlamet		Peak Discharge At The Dalles	Approximate Recurrence Interval
	Stage (Feet CRD)	Elevation (Feet NGVD)	(Cubic Feet Per Second)	(Years)
June 1894	15.0	13.2	1,240,000	80
June 1948	12.8	11.0	1,010,000	48
June 1876	11.9	10.1	958,000[1]	18
June 1956	11.7	9.9	823,000[2]	17[2]
December 1933	11.7	9.9	--[2]	--[2]
December 1964	11.5	9.7	--[2]	--[2]
June 1950	11.4	9.6	744,000[3]	9

[1] Regulated Flow (Unregulated Flow, 940,000 cfs)
[2] Peak Discharge at The Dalles Not Representative of Large Winter Floods on Columbia River Below Vancouver, Washington
[3] Regulated Flow (Unregulated Flow, 823,000 cfs)

Columbia River flood-control system consists of a series of flood-control storage reservoirs in both the United States and Canada. There are 22 major reservoirs in the Columbia River basin upstream of the Willamette River, with a total flood-control storage volume of approximately 43.6 million acre-feet (Reference 9).

In addition, there are 11 major flood-control reservoirs in the Willamette River basin, with approximately 1.7 million acre-feet of flood storage (Reference 9). Mossy Rock Reservoir on the Cowlitz River also contributes 360,000 acre-feet of flood-control storage upstream of Cathlamet (Reference 10). The combined total of flood-control storage available on the Columbia River upstream of Cathlamet is approximately 45.7 million acre-feet.

There are no flood-control structures on Birnie Creek.

Nonstructural measures (flood hazard zoning ordinance and building permits) are also being used to aid in the prevention of future flood damage. The zoning ordinance, enacted June 6, 1977 (Reference 11), follows the FEMA guidelines for controlling development within the 100-year flood plain.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data required for this study. Flood events of a magnitude which are expected to be equaled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10, 2, 1, and 0.2 percent chance, respectively, of being equaled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than 1 year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (1 percent chance of annual exceedence) in any 50-year period is approximately 40 percent (4 in 10), and, for any 90-year period, the risk increases to approximately 60 percent (6 in 10). The analyses reported herein reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for each flooding source studied in detail affecting the community.

There are no stream gage stations on Birnie Creek. The frequency discharges were developed from the regional analysis presented in Magnitude and Frequency of Floods in Western Oregon, (Reference 12). The frequency discharges developed by this procedure were checked by a Meyer's rating curve for the 100-year event prepared for northwest Oregon.

Peak discharge-drainage area relationships for Birnie Creek are shown in Table 2.

Analyses were carried out to establish the peak elevation-frequency relationships for each flooding source studied in detail.

The stage-discharge relationship for the Columbia River near Cathlamet is influenced by ocean tides. Thus, flood frequencies are more reliably determined for stages than for discharges and combined probability stage-frequency curves were developed for several locations on the Columbia River, including R.M. 41.8 at Wauna, Oregon, across the Columbia River (and Puget Island) from Cathlamet. These curves were based on the statistical combination of stage-frequency curves for fall-winter floods and spring-summer floods and used to produce combined probability stage-frequency water-surface profiles (Reference 13). Cathlamet Channel elevations were derived by a correlation process connecting the elevation of the Columbia River upstream and downstream of Puget and Little Islands.

Elevations for floods of the selected recurrence intervals on the Columbia River--Cathlamet Channel are shown in Table 3.

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of flooding from the sources studied were carried out to provide estimates of the elevations of floods of the selected recurrence intervals.

Analyses were carried out to provide estimates of the 100-year flooded-area outline for the approximate study on Birnie Creek. Approximate flooding for Birnie Creek was developed using hand computations. These include a culvert analysis for the four road fills that cross Birnie Creek through the study reach and also normal-depth hand computations for several Birnie Creek cross sections. Cross section data were obtained from Washington State Highway Department maps for Cathlamet and vicinity, dated 1963 (Reference 14). Culvert data for the four road crossings were obtained in the field by COE personnel.

Columbia River flood profiles for selected recurrence intervals were plotted directly from the combined probability stage-frequency

Table 2. Summary of Discharges

Flooding Source and Location	Drainage Area (Square Miles)	100-Year Peak Discharges (cfs)
Birnie Creek		
At Approximately 800 Feet Upstream of State Highway 4	1.35	250
At Mouth	1.60	290

Table 3. Summary of Flood Elevations

Flooding Source and Location	Drainage Area (Square Miles)	Flood Elevations (Feet NGVD) 10-Year	50-Year	100-Year	500-Year
Columbia River Near Cathlamet at Cathlamet Channel (R.M. 40)	257,000	9.7	10.5	10.9	11.8

curves previously described. Cathlamet Channel flood elevations were derived by using elevations from Columbia River profiles at the upper and lower ends of Puget Island, correlating those points with Cathlamet Channel river mileage and connecting them by straight lines.

No cross sections or computer model was developed for the Columbia River.

The hydraulic analyses for this study were based on unobstructed flow. The flood elevations shown on the profiles are thus considered valid only if hydraulic structures remain unobstructed, operate properly, and do not fail.

All elevations are referenced to the NGVD of 1929. Elevation reference marks used in this study are shown on the maps; the descriptions of the marks are presented in Elevation Reference Marks (Exhibit 3).

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The NFIP encourages State and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study provides 100-year flood elevations and delineations of the 100- and 500-year flood plain boundaries and 100-year floodway to assist communities in developing flood plain management measures.

4.1 Flood Plain Boundaries

To provide a national standard without regional discrimination, the 1 percent annual chance (100-year) flood has been adopted by FEMA as the base flood for flood plain management purposes. The 0.2 percent annual chance (500-year) flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the 100- and 500-year flood plain boundaries have been delineated using the flood elevations determined at each cross section. Between cross sections, the boundaries were interpolated using topographic maps at scales of 1:2,400 and 1:62,500, with contour intervals of 5 and 80 feet (References 14 and 15).

The 100- and 500-year flood plain boundaries are shown on the Flood Insurance Rate Map (Exhibit 2). On this map, the 100-year flood plain boundary corresponds to the boundary of the areas of special flood hazards (Zones A and AE), and the 500-year flood plain boundary corresponds to the boundary of areas of moderate flood hazards. In cases where the 100- and 500-year flood plain boundaries are close together, only the 100-year flood plain boundary has been shown. Small areas within the flood plain boundaries may lie above the flood elevations but cannot be shown due to limitations of the map scale and/or lack of detailed topographic data.

For the streams studied by approximate methods, only the 100-year flood plain boundary is shown on the Flood Insurance Rate Map (Exhibit 2).

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4.2 Floodways

The floodway is the channel of a stream, plus any adjacent flood plain areas, that must be kept free of encroachment so that the 100-year flood can be carried without substantial increases in flood heights.

A floodway was not computed on the reach of the Columbia River or Cathlamet Channel fronting Cathlamet.

5.0 INSURANCE APPLICATION

For flood insurance rating purposes, flood insurance zone designations are assigned to a community based on the results of the engineering analyses. These zones are as follows:

Zone A

Zone A is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by approximate methods. Because detailed hydraulic analyses are not performed for such areas, no base flood elevations or depths are shown in this zone.

Zone AE

Zone AE is the flood insurance rate zone that corresponds to the 100-year flood plains that are determined in the Flood Insurance Study by detailed methods. Whole-foot base flood elevations derived from the detailed hydraulic analyses are shown at selected intervals within this zone.

Zone X

Zone X is the flood insurance rate zone that corresponds to areas outside the 500-year flood plain, areas within the 500-year flood plain, areas of 100-year flooding where average depths are less than 1 foot, areas of 100-year flooding where the contributing drainage area is less than 1 square mile, and areas protected from the 100-year flood by levees. No base flood elevations or depths are shown within this zone.

6.0 FLOOD INSURANCE RATE MAP

The Flood Insurance Rate Map is designed for flood insurance and flood plain management applications.

For flood insurance applications, the map designates flood insurance rate zones as described in Section 5.0 and, in the 100-year flood plains

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that were studied by detailed methods, shows selected whole-foot base flood elevations or average depths. Insurance agents use the zones and base flood elevations in conjunction with information on structures and their contents to assign premium rates for flood insurance policies.

For flood plain management applications, the map shows by tints, screens, and symbols the 100- and 500-year flood plains.

7.0 OTHER STUDIES

The COE is preparing a Flood Insurance Study for the unincorporated areas of Wahkiakum County (Reference 2), which includes the area surrounding Cathlamet. The results of this study and the Wahkiakum County Flood Insurance Study are in agreement.

A Flood Hazard Boundary Map was prepared for the Town of Cathlamet, Washington (Reference 16). However, this study represents a more detailed analysis.

A report prepared for the Wahkiakum County Board of Commissioners by an engineering consulting firm in 1975, titled Flood Damage Prevention Plan, Wahkiakum County, presents a plan for implementation of flood-damage reduction measures; however, the report does not delineate flooded areas in the immediate vicinity of Cathlamet (Reference 17).

This study is authoritative for the purposes of the NFIP; data presented herein either supersede or are compatible with all previous determinations.

8.0 LOCATION OF DATA

Information concerning the pertinent data used in the preparation of this study can be obtained by contacting the Natural and Technological Hazards Division, FEMA, Federal Regional Center, 130 228th Street, SW., Bothell, Washington 98021-9796.

9.0 BIBLIOGRAPHY AND REFERENCES

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8. Federal Emergency Management Agency, Flood Insurance Study, Multnomah County, Oregon (Unincorporated Areas), 1981

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10. Federal Emergency Management Agency, Flood Insurance Study, City of Kelso, Washington, 1979

11. Town of Cathlamet, Resolution No. 60, Flood Plain Zoning Ordinance, passed June 6, 1977

12. U.S. Department of the Interior, Geological Survey, Magnitude and Frequency of Floods in Western Oregon, Open-File Report 79-553, 1979

13. U.S. Department of the Army, Corps of Engineers, Portland District, Columbia River, Combined Probability Flood Frequency Profiles, Mouth to Bonneville Dam, October 1979

14. Washington State Department of Highways, Topographic Map D-2, Cathlamet Vicinity, Wahkiakum County, Primary State Highway No. 12, Scale 1:2,400, Contour Interval 5 feet, 1963

15. U.S. Department of the Interior, Geological Survey, 15-Minute Series, Topographic Maps, Scale 1:62,500, Contour interval 80 feet: Cathlamet, Oregon - Washington (1953)

16. U.S. Department of Housing and Urban Development, Federal Insurance Administration, Flood Hazard Boundary Map, Town of Cathlamet, Washington, April 2, 1976

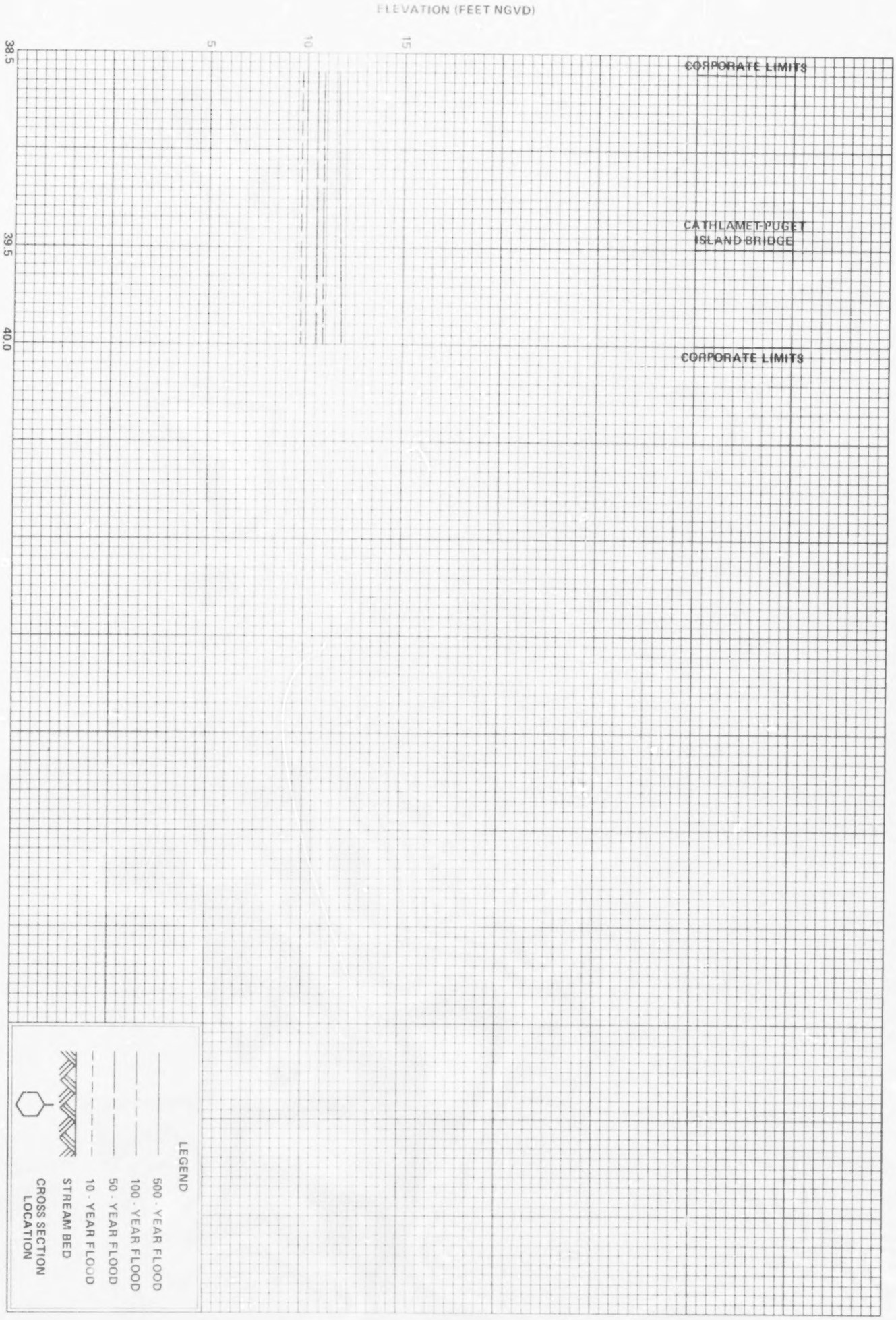
17. VTN Washington, Inc., Flood Damage Prevention Plan, Wahkiakum County, April 1975

Exhibit 3 - Elevation Reference Marks

REFERENCE MARK	FIRM PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM1	0001	53.46	A U.S. Coast and Geodetic Survey standard disk stamped "K 63 1934" and set in the top of a concrete post projecting approximately 1 inch above ground, located at the county courthouse, in the southeast corner of the lawn, 50 feet east of the southeast corner of the building, 2.5 feet south of a concrete sidewalk, and 2.5 feet north of the north edge of a driveway leading to Main Street.
RM2	0001	47.81	A U.S. Coast and Geodetic Survey Standard disk stamped "BM NO 2 1936", 10 feet north of the intersection of the west curb of Main Street and the north curb of Broadway, in the west curb of Main Street and just above a gutter catch basin.

Exhibit 3 - Elevation Reference Marks (Cont'd)

REFERENCE MARK	FIRM PANEL	ELEVATION (FEET NGVD)	DESCRIPTION OF LOCATION
RM3	0001	11.02	A chiseled cross near the chiseled letters "U.S.E.", at the foot of Broadway, on the southeast corner of the concrete pavement, 69 feet southwest of the west corner of a funeral parlor, 14.6 feet northwest of the west corner of a metal-covered warehouse, 7.8 feet southwest of the center line of the pavement, 1 foot northeast of the southwest end of the concrete pavement, just above the approach to the old ferry dock, and 3.8 feet northwest of a power transmission line pole. Established by U.S. Army Corps of Engineers.



01P	FEDERAL EMERGENCY MANAGEMENT AGENCY TOWN OF CATHLAMET, WA (WAHKIAKUM CO.)	FLOOD PROFILES COLUMBIA RIVER (CATHLAMET CHANNEL)